WHAT IS CLAIMED IS:

1. A device comprising:

at least two computational elements, each computational element being shaped as a ring-like structure, wherein each computational element is magnetically coupled to at least one adjacent computational element; and

an interface structure configured to provide magnetic access to the computational elements.

2. The device of claim 1, wherein said ring-like structure comprises a ring having a single hole therein.

3. The device of claim 2, wherein said ring comprises a superconducting material of type I.

4. The device of claim 1 wherein said computational element is magnetically coupled with the at least one adjacent computational element by sharing the core of a transformer.

5. The device of claim 4 wherein said core comprises a permalloy.

6. The device of claim 1, wherein the interface structure comprises at least one input-output element, and wherein each of said input-output elements is magnetically coupled to an adjacent computational element.

7. The device of claim 1, wherein the interface structure comprises:

at least one input element and at least one output element, said input element and said output element being magnetically coupled to an adjacent computational element.

8. The device of claim 6, wherein said input-output element is configured as a semi-closed ring.

9. The device of claim 7, wherein each of said input element and output element is magnetically coupled to an adjacent computational element by sharing the core of a transformer.

10. The device of claim 1, wherein said computational elements are positioned in a two-dimensional array, and at least one of the computational elements at a border of this two-dimensional array is coupled to an input element, and wherein at least one of the other

computational elements at the border of this two-dimensional array is coupled to an output element.

11. The device of claim 1, wherein each of the at least two computational elements is configured to change its conductive state from superconducting to ohmic conduction in response to a magnetic pulse.

12. The device of claim 1, further comprising a circuit configured to provide a current to the input element, and another circuit configured to receive a current from the output element.

13. The device of claim 1, wherein the ring-like structure is configured as a closed structure to allow a closed current flow therein.

14. The device of claim 13, wherein the ring-like structure is positioned between the interface structure and another interface structure, and wherein each interface structure comprises a semi-closed ring shaped element.

15. The device of claim 14, wherein one of the semi-closed ring shaped elements operates as in input for receiving a time-dependent current signal, and the other semi-closed ring shaped element operates as an output for outputting a current signal.

16. The device of claim 15, wherein the time-dependent current signal is indicative of information in a quantum system.

17. The device of claim 1, wherein the computational element comprises a topological space of genus 1.

18. The device of claim 1, wherein the device comprises a quantum computer.

19. The device of claim 1, wherein each of the at least two computational elements comprises a closed-ring structure having a single hole.

20. The device of Claim 19, wherein the at least two closed-ring structures are magnetically coupled to compute information.

21. A method of forming a device comprising at least two computational elements, the method comprising:

depositing on a substrate a superconductive material;

patterning said superconductive material to form the at least two computational elements and at least one input-output element; and

depositing an insulating layer on at least a portion of said patterned computational elements and said patterned input-output element.

22. The method of claim 21 further comprising:

depositing a first magnetic layer on said substrate, prior to the step of depositing the superconductive material;

patterning said first magnetic layer to form at least a lower portion of a core shared between adjacent computational elements, said lower portion being overlapping with said adjacent computational elements;

forming at least one hole in said insulating layer to expose said lower portion; and

depositing a second magnetic layer to define at least vertical portions of said core.

23. The method of claim 22 further comprising depositing a third magnetic layer and patterning said third magnetic layer to form an upper portion of said core.

24. A method of performing a quantum computation comprising:

applying a magnetic pulse to a computational element; and

causing a change in the conductive state of said computational element from superconducting to ohmic conduction, the change being responsive to applying the magnetic pulse.